

The Challenge of the Space Age

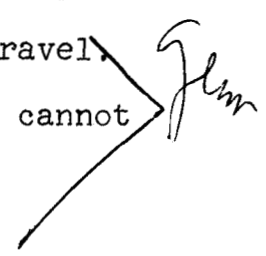
by

T. Keith Glennan, Administrator
National Aeronautics and Space Administration
Annual Banquet, Fort Worth Chamber of Commerce
December 8, 1958

It is a very real pleasure being with you tonight. I seem to feel very much at home with the folks I have met here in Dallas. Certainly, I can make no claim to a Texas birthright. But perhaps my Middle Western background gives me a sense of kinship with your own heritage of hard work and drive.

Fifty years ago, my Dad was a member of the elite of American workmen. He was one of many men whose job and privilege it was to keep the railroad trains running ... at all costs ... in times of blizzard and in times of flood. At home we learned quickly some of the facts of life that you Texans know so well: When a man has a job to do, he does it ... He rolls up his shirt sleeves and his sweat helps him get the job done.

We at NASA have been given a big job -- planning and executing the nation's civilian space program. But before talking about some aspects of our task, I would first like to dispose of a question that is asked of me quite often: Why venture at all into the unknown, towards the moon, the planets and then towards the stars so far beyond? One answer was given by Tsiolkowsky, the 19th century scientist whom Russia considers the grandfather of space travel. It was that, "the earth is the cradle of the mind, but one cannot live forever in a cradle."



Another, simpler way of answering that question is to say that man always has had his eyes fixed upon the stars. Now, for the first time, he has the ability to take his first faltering steps toward those goals. And because we are the way we are, there will always be those among us who will venture off, to seek our El Dorados in the sky.

But don't be misled. "The thrust of curiosity that leads man to try to go where no one has gone before" by itself isn't reason enough to justify the expenditure of the hundreds of millions that such ventures into space will cost. There also must be a payoff -- to the American taxpayers who are footing the bills.

Scientists are satisfied with the idea of searching for new knowledge for its own sake. Actually, there is a great deal of evidence in history to prove the thesis that the scientific progress made in this fashion has provided great benefits to mankind that were undreamed of by the scientists themselves.

As realists, we have to be interested at least equally in the early and direct benefits which we may anticipate from our investments in space technology. We have to think about what will result of value to the people who are now alive -- people like us here tonight. A little later, I shall discuss some of the prospects we may expect in the years immediately ahead.

One year ago this week, the United States made its first attempt--two months after the first Russian success--to launch a man-made satellite. A day or two later Marguerite Higgins, the well-known news correspondent, asked a question, more pointedly than most of

us had phrased it: "If our Vanguard's failure is considerably less than fatal, and if Russia's Sputnik was something less than totally decisive, the question remains as to why these events set off such shock waves throughout the world and particularly in America."

There have been, of course, almost as many responses to that comment as there have been thinking people. In the past 12 months, we in the United States have made a soul-searching re-examination of our course and our destiny. Much good has come from this great appraisal of where we stand in the world of science, and more particularly, where we stand in space technology. Perhaps equally important, we have done more than just think and talk.

Let me review quickly some of the events of the past year, as President Eisenhower and the Congress -- with Senator Lyndon Johnson especially providing signal leadership -- moved quickly.

One of the first actions by the President was to appoint James R. Killian, Jr., president of M.I.T., as his special assistant for science and technology, and to direct him to come forward with recommendations for whatever action was necessary. In both the House and Senate, special committees studied the question of what our nation should be doing in space matters.

We quickly stepped up our programs of space experiments. The Army undertook a series of Explorer satellite launchings, and, a little later, the President directed the Air Force and the Army to fire instrument packages into space in the neighborhood of the moon. Note, I have chosen my words carefully...we were not seeking to hit

the moon. Rather, we wanted to send our instruments as far as the moon, and even beyond...obtaining data all the way on those voyages of nearly a quarter million miles. In addition, and here we were admittedly being extraordinarily sanguine in view of the state of the technology, we hoped to put some of our space probes into orbit around the moon. We hoped to get a rudimentary picture of the back side of the moon and to telemeter it back to earth.

The Advanced Research Projects Agency was established within the Department of Defense, to give technical direction to military space activities. In addition to its military assignment, ARPA was given initial responsibility for technical direction of civilian space activities, until such time as the necessary new organization had been completed to undertake that responsibility.

In March, the President sent a special message to the Congress, calling for establishment of the National Aeronautics and Space Administration. Perhaps the most significant single thought in the National Aeronautics and Space Act of 1958 which resulted is the one embodied in the statement, and I quote, "It is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind." The national decision that is explicit in this statement will, I believe, be long remembered as a tremendously important step forward in man's struggle to rise to a state of maturity and real civilization.

This national position is so important, I should like to quote briefly from comments about it by your own Senator Johnson last

month before the United Nations. I quote Senator Johnson not only because his part in the passage of the Space Act was so significant, but also because his remarks have the ring of eloquence that comes from earnest conviction. He said:

"On the goal of dedicating outer space to peaceful purposes for the benefit of all mankind, there are no differences within our Government, between our parties, or among our people. The Executive and the Legislative Branches of our Government are together. United we stand.

"The very opportunity of the issue...is to erase the accumulated differences of our earth's long and troubled history and to write across the vastness of space a proud new chapter of unity and peace.

"It is the American vision, I believe, that out of this fresh start for humankind which space affords, man may at last free himself of the waste of guarding himself against his ignorance of his neighbors. Barriers between us will fall as our sights rise to space. Secrecy will cease to be. Man will come to understand his fellow man -- and himself -- as he has never been able to do. In the infinity of the space adventure, man can find growing richness of mind, of spirit, and of liberty."

As Americans, we can be proud that our country is leading, and in fact for nearly a year, has led in the effort to establish a workable system that will give meaning to the principle that space flight is, or at least should be, inherently international. That such cooperation in scientific effort at the international level

can be had has been amply demonstrated by the success of the International Geophysical Year activities which have occupied the attention of thousands of scientists all over the world for the past eighteen months. We seek to extend that cooperation, so well begun in the IGY, to the exploration of outer space for the benefit of humanity.

There can be no quarrel, of course, with the idea that such use of space as may be required for national defense is and must remain a responsibility of the Department of Defense. That premise is spelled out in the Space Act. It is stipulated that matters of proper military concern include, and I quote: "activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the Defense of the United States)."

(In some areas of space activity, there is a duality of interest) This fact was also recognized by the law makers, and the House Space Committee commented about it as follows:

"Although weather and communications satellites, manned platforms, and the like have obvious military uses, their primary purpose should be declared civilian. If we do not do this, we automatically commit the world of the future to the same stalemated life in armor which is lived by the world of today. If the very efficiency of current weapons virtually denies the practicable possibility of total war, further strides made in our rocket development would probably intensify this denial... The entire purpose

of our effort should be to insure that the peaceful uses of these devices prevail. This is the stated philosophy behind our space exploration. It is the philosophy of this country."

Under our democratic system of government--I should like to interpolate that I am sure that for us, it is the very best form of government--it sometimes seems as if the lag between ideas and accomplishments is unnecessarily long. But if that time is well used to think through all the related problems, then it is not time wasted.

The Space Act was passed late in July and the President signed it on the 29th of that month. He appointed me on August 8, and, after confirmation by the Senate, I was sworn in on August 19. Because I had unbreakable commitments with respect to the impending beginning of a new school year at Case, I was unable to check in at NASA headquarters for full-time work until September 9.

It seems hardly possible that it won't be until tomorrow that the first three months of this new adventure have been completed. In many ways, it seems as if NASA had always been in business!

One big reason why we are now traveling ahead at nearly full steam is that the NASA is built upon the structure of the National Advisory Committee for Aeronautics...which from 1915 until October 1 of this year was the nation's aeronautical research agency. From NACA we got nearly 8,000 hard-working, talented people; we got \$300,000,000 in research facilities; we got well-planned research programs already underway.

Soon after I came on the job, I addressed the former NACA employees. I told them that NASA's scope was much broader, and that its objectives were much greater, than those of NACA. For example, the admittedly vital functions of NACA...research into the problems of flight...are only one part of NASA's activities.

NASA's job was to broaden and extend the excellent team-work relationships NACA enjoyed over the years with the Military Services and the airplane-missile-space industry. Again, I digress to say that NACA had the most useful and friendly relationships with organizations like Convair-Fort Worth, Chance Vought, and Bell Helicopters, to name just three of the area companies that are working in the fields of flight. Earlier today, I had a chance to look at the B-58 production lines with my good friend and former Yale classmate, Augie Esenwein, and onceagain, I was reminded of the wonderful reputation NACA earned over the years...a reputation resulting from such pioneering developments as the "area rule" and the conical camber principle that are incorporated with useful effect on the supersonic B-58 Bomber.

NASA obviously has to add new and extremely able people to the staff, to develop capabilities in fields other than those where NACA was strong. These needs, in addition to our determination to avoid unnecessary expenditures for facilities which would duplicate others already in existence and to avoid the inevitable competition for personnel necessary to man new facilities, led us to seek out an arrangement with the Defense Department whereby certain laboratories and personnel might be made available to us at an early

date. As you doubtless know, these negotiations were completed last week with the transfer of the Jet Propulsion Laboratory in Pasadena to NASA and the signing of an agreement relating to the use of a portion of the capabilities of the Army Ballistic Missile Agency by NASA. The latter group will remain under Army direction but will be responsive to the needs of the NASA managed civilian space program as may be required.

We are now administering substantial programs of research, development, and procurement with others on a contract basis. We will be spending large amounts of money, outside the agency, by contracts with scientific and educational institutions and with industry. We are using other facilities of the Military Services, such as the launching pads at the Atlantic and Pacific Missile Ranges. We have to collect great masses of scientific data, and we have to reduce this information into useful form.

We are in the business of developing and launching into space vehicles needed to obtain scientific data...we are in the business of exploring the solar system. We are preparing for the day of manned flight into space.

Now...getting back to the pay-off. I can tell you of a couple very obvious uses of satellites and space platforms...ones that offer very direct and immediate pay-off possibilities.

One of these, of course, has to do with meteorology. Dr. Francis W. Reichelderfer, Chief of the U.S. Weather Bureau, estimates the value of the more accurate, longer range weather forecasting and storm warnings that we can expect to attain from good use of space technology will be several billion dollars a year.

Over the years, great progress has been made in this direction, but there are definite limits to what we can hope for in weather prediction so long as our observations must be made entirely from within the earth's atmosphere. One example is the way the behavior of the air masses over the oceans often determines the weather over the inhabited land masses. These great areas of water, as every schoolboy is taught, cover more than two-thirds of the earth's surface. We know so little about how the world's weather is generated over these vast ocean masses and over the polar areas that we are unable to forecast the resulting weather accurately. This is particularly important in the case of devastating typhoons and tornadoes. We have made some progress in our aerial study of hurricanes that form in the Caribbean, but the cost to expand this kind of effort around the world would be great, and the information obtained insufficient to warrant the added cost.

With properly instrumented satellites, the meteorologists can watch storms form and move and disappear, all around the world on a 24-hour basis. They can study also the physical processes that make our weather...how the earth's surface absorbs heat energy from the sun in varying amounts, and how the heat circulates unevenly between the equatorial and polar regions. By observing, measuring, and then understanding these complicated heat-transfer processes, the meteorologists expect to be able to predict normal and abnormal weather, including the onset of destructive droughts, catastrophic windstorms, and flood-producing rains. Beyond all this, they dare dream about the day when, finally, they will have fully comprehended the meaning of their new knowledge, and may then be able to an extent, to modify the weather. Dr. Reichelderfer's calculation of several billion dollars

a year was premised on the value of more accurate, longer range weather and storm forecasting. The value of weather control would be incalculable.

The use of satellites in communications also offers the prospect of great advantages and economies. In this area, I can report, there is such keen interest that several of our most profit conscious electronics companies are spending money of their own to insure if possible that they have the competence to insure their participation in such satellite operations. Dr. Wernher von Braun, director of the Development Operations Division of ABMA at Huntsville, Alabama, estimates that the use of man-made satellites to transmit commercial messages and TV programs on a global basis will be not only commercially practicable but will, and I quote, "pay for trips to the moon and other ventures in this business."

But what of the longer pull? What is the payoff prospect there? Let us face the fact that the space bill will be one that is counted, year after year for a long time to come, in the hundreds of millions of dollars. Unfortunately, as Norman Cousins has pointed out, this activity will take its toll of young lives, as well. I don't know all the good that will result, and I doubt if any man alive today can give really specific answers.

But in this connection, I am reminded of the story they tell about Michael Faraday, the English physicist, whose pioneering work in electro-magnetics had such a profound effect upon our later understanding of electro-dynamics leading to the development of useful electric power. It was about a hundred years ago that Mr. Faraday is supposed to have been asked, in the British Parliament, about the value of his electro-magnetic experiments. His answer, so the story

goes, was, "I can't tell you what it'll be good for. But I'll tell you this: One of these days you'll be taxing it."

And, by way of conclusion, I'd like to quote another very wise man...a member of the President's Space Council and my valued friend ...Jimmie Doolittle:

"I can't tell you precisely what of great value will come out of our moving into space to probe the secrets of the universe. However, I have the conviction, and in this I find myself in the company of some very wise men, that a century from now, perhaps much sooner, people will say that this venturing into space that we're planning now was one of the most practical, intelligent investments of our national wealth to be found in history. If we in the United States take the wisely bold action necessary to lead in exploiting the possibilities of space technology for science, all mankind will benefit."